COMMONWEALTH INST.
ENTOMOLOGY LIBRARY
- 1 APR 1954
U.S.A.109
SERIAL
SEPARATE

The Florida Entomologist

MARCH, 1954

Vol. XXXVII No. 1

CONTENTS

Page

SPENCER, HERBERT, and PAUL A. NORMAN—Control of purple scale on tangerine trees with parathion sprays 3

WOLFENBARGER, D. O.—Potato yields associated with control of aphids and the serpentine leaf miner 7

GUTHRIE, F. E., and F. S. BAKER, JR.—Malathion and diazinon for control of house flies in North Florida cattle barns 13

Book Notice 17

HUSSEY, ROLAND F.—Concerning the Floridian species of Fulvius (Hemiptera, Miridae) 19

CUMMING, ROBERT B.—Notes on the genus *Metaleptobasis* with the description of a new species from Panama (Odonata: Coenagriidae) 23

Centennial of Professional Entomology 33

Perry Wilbur Fattig 34

Membership List of the Florida Entomological Society 35

Published quarterly by the FLORIDA ENTOMOLOGICAL SOCIETY
Box 2425, University Station, University of Florida, Gainesville

The
FLORIDA ENTOMOLOGIST

VOL. XXXVII MARCH, 1954 NO. 1

THE FLORIDA ENTOMOLOGICAL SOCIETY

OFFICERS FOR 1953-1954

President ..... D. O. WOLFENBARGER
Vice President ..... F. G. BUTCHER
Secretary ..... MILLEDGE MURPHEY, JR.
Treasurer ..... W. P. HUNTER
Executive Committee ..... I. H. GILBERT, J. W. WILSON

EDITORIAL BOARD

LEWIS BERNER ..... *Editor*
L. C. KUITERT ..... *Associate Editor*
W. P. HUNTER ..... *Business Manager*

Issued quarterly—March, June, September, and December. Subscription price to non-members $3.00 per year in advance; 75 cents per copy. Entered as second class matter at the post-office at Gainesville, Florida.

Manuscripts and other editorial matter should be sent to the Editor, Dr. Lewis Berner, Biology Department, University of Florida, Gainesville. Subscriptions and orders for back numbers are handled by the Business Manager, Mr. W. P. Hunter, Box 2425, University Station, University of Florida, Gainesville. The Secretary can be reached at the same address.

One zinc etching, not to exceed one-half page in size, or the equivalent thereof, will be allowed free. The actual cost of all additional illustrations must be borne by contributors. In general, the cost of a full page zinc etching is $7.50. Reprints of articles may be secured by authors if they are ordered before, or at the time proofs are received for correction; 25 copies furnished free to authors.

REPRINTS WITHOUT COVERS

Pages	1	2	3–4	5–8	9–12	13–16	17–20	21–24	25–28	29–32
50 copies.....	1.60	2.00	2.70	4.25	6.70	7.25	9.40	10.40	12.05	12.80
100 copies.....	1.95	2.40	3.20	5.10	7.80	8.60	11.00	12.95	15.10	16.20
Add 100 copies.....	.75	.75	1.10	1.60	2.70	3.10	3.70	4.80	5.85	6.20

Additional for Covers, with Titles and Author's Name

25 copies ..... $3.50 100 copies $5.00

CONTROL OF PURPLE SCALE ON TANGERINE TREES WITH PARATHION SPRAYS

HERBERT SPENCER and PAUL A. NORMAN [1]

Until the appearance of the new phosphorus insecticides in 1946, oil-emulsion spray was the only insecticide available for control of purple scale, *Lepidosaphes beckii* (Newm.), on tangerine trees. This spray can be applied safely only in late spring or early summer. Fall applications retard degreening and delay maturity of the fruit. Applications in dry weather or in winter may result in partial defoliation of the trees. Therefore, for fall and winter infestations of purple scale on tangerines there was no satisfactory means of control.

Much the same problem was investigated cooperatively by Harding (1953), Spencer and Norman (1953), and their associates on the early orange varieties Hamlin and Parson Brown. After three years of work they found that addition of parathion twice each year to sprays of wettable sulfur used for the control of citrus rust mite, *Phyllocoptruta oleivora* (Ashm.), would give year-around control of purple scale, would allow fruit to color and mature normally, and would not defoliate trees. Therefore, beginning in 1951, a similar experiment was set up on tangerine trees.[2]

Four groves of tangerine trees in Florida were selected—the Owens Grove near Grand Island, the English Kumquat and House Groves at Mt. Homer near Tavares, and the Barnett Grove near Lake Gem. In each grove there were 6 rows of 10 trees each. The sprays were applied to solid rows, but the relative positions of the six sprays were assigned at random.

Three materials were tested—an oil emulsion, wettable sulfur, and parathion. The oil emulsion was a cream-type concentrate containing 90 percent of oil.[3] The wettable sulfur was a 90-percent commercial product which contained, in addition to wetting agents, a fraction of 1 percent of blood albumen for spread-

---

[1] United States Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine.

[2] Cooperators were Paul L. Harding and Milliard B. Sunday, Bureau of Plant Industry, Soils, and Agricultural Engineering, Orlando, Fla.; J. B. Prevatt and C. C. Thullbery, Lake Region Packing Association, Tavares, Fla.; and grove owners Frank Owens, Colin English, and Wm. R. Barnett.

[3] The oil had a viscosity of 73-78 seconds Saybolt and an unsulfonatable residue of 90-92 percent.

ing and sticking. The parathion was a 15-percent wettable powder formulated in Florida. The early summer sprays were applied on June 21, 1951, and June 18, 1952, and the late summer sprays were applied on August 15, 1951, and August 19, 1952.

In both years infestation estimates were made prior to the first spraying and near picking time. Fifty leaves were cut at chest level from around each tree, and each leaf was tallied as infested or not infested. In table 1 the results are given first as percentages of leaves infested. This method does not distinguish between living scales on the leaf and dead scales still adherent to the leaf. Furthermore, scales killed by oil drop from the leaf much more quickly than do those killed by parathion. Therefore, in the final samplings 20 leaves per tree were examined for living purple scales under a binocular microscope and the results recorded as the number of living scales per 100 leaves.

Similar results were obtained in all four groves. The trees that were sprayed four times with wettable sulfur in the two years and had no oil or parathion showed marked increases in purple scale infestations. With no scalicide for two years a 9.6-percent leaf infestation in the Owens Grove increased to 32.6 percent, a 17.6-percent infestation in the Barnett Grove to 75 percent, a 20.8-percent infestation in the Kumquat Grove to 86.4 percent, and an 8.6-percent infestation in the House Grove to 22 percent.

Oil-emulsion sprays applied in June each year gave midseason control, but in three of the four groves allowed enough build-up to push infestation percentages above the initial infestations. The same was true of the single early applications of parathion. Parathion sprays applied only in August likewise gave unsatisfactory year-around control. The late sprays left few living scales at picking time, but early-season build-up had been too high, as evidenced by percentages greatly exceeding the initial infestation. In general, single sprayings each year, either of oil or of parathion, were insufficient to reduce infestations over the two-year period.

Better results were had with two sprays of parathion each year. These programs reduced living purple scales to very low levels. After these treatments no living scales were found on two 100-leaf samples at the end of 1952, and the highest infestation was 6 living scales on 100 leaves. One pound of parathion per 100 gallons gave results statistically equivalent to those from 2 pounds.

TABLE 1.—Purple Scale Infestations in Four Groves of Tangerine Trees in Florida Treated with Various Sprays, 1951 - 1952.

Pounds of scalicide added to 5 pounds of wettable sulfur per 100 gallons		Percent of leaves infested		Number of living scales per 100 leaves	Percent of leaves infested		Number of living scales per 100 leaves
Early summer	Late summer	Nov. 1951	Nov. 1952	Nov. 1952	Jan. 1952	Oct. 1952	Dec. 1952
		Owens Grove (9.6%)*			Kumquat Grove (20.8%)		
Oil emulsion 1.3 gal.**	No scalicide	17.8	23.2	9	16.6	25.0	14
Parathion 2	No scalicide	18.2	21.2	4	32.6	42.2	30
No scalicide	Parathion 2	26.4	11.6	1	29.6	50.2	2
Parathion 2	Parathion 2	12.4	7.2	1	29.0	23.0	6
Parathion 1	Parathion 1	6.8	7.2	2	41.2	33.4	4
No scalicide	No scalicide	40.6	32.6	14	50.0	86.4	457
Significant difference at 5% level		9.2	7.6	7	9.0	8.0	11
1% level		12.6	10.1	9	12.0	11.4	15
		Barnett Grove (17.6%)			House Grove (8.6%)		
Oil emulsion 1.3 gal.**	No scalicide	7.2	16.2	6	10.2†	1.2	1
Parathion 2	No scalicide	15.0	14.8	8	22.8	4.0	0
No scalicide	Parathion 2	31.8	34.2	4	26.6	4.4	1
Parathion 2	Parathion 2	10.0	16.0	5	17.0	1.8	0
Parathion 1	Parathion 1	17.2	18.2	6	21.0	2.2	0
No scalicide	No scalicide	44.4	75.0	67	44.4	22.0	12
Significant difference at 5% level		7.6	8.0	24	7.4	4.4	—
1% level		10.4	10.8	33	9.8	5.6	—

* Figures in parentheses indicate the prespray infestation in each grove June 21, 1951.

** No wettable sulfur.

† Data for House Grove in this column obtained in March, 1952.

In one grove in 1951 half the trees sprayed with oil emulsion were severely defoliated and had a very light crop. They recovered in 1952. The parathion sprays caused no defoliation or harm to the fruit.

From these experiments it appears that the addition of 1 pound of 15-percent wettable parathion per 100 gallons to wettable sulfur sprays applied twice a year for control of the citrus rust mite would reduce purple scale infestations on tangerine trees to low levels and would keep them there. This procedure would solve the problem of heavy fall infestations that often occur with an oil-emulsion control program. This parathion program costs less than the oil program, since parathion can be added to regular sprays whereas oil sprays must be applied separately and at extra cost to the grower.

LITERATURE CITED

Harding, Paul L. 1953. Effect of oil emulsion and parathion sprays on composition of early oranges. Proc. Amer. Soc. Hort. Sci. 61: 281-285.

Spencer, Herbert, and Paul A. Norman. 1953. Parathion for control of purple scales on early varieties of oranges. Fla. Ent. 36(1): 13-19.

POTATO YIELDS ASSOCIATED WITH CONTROL OF APHIDS AND THE SERPENTINE LEAF MINER [1]

D. O. WOLFENBARGER
University of Florida, Sub-Tropical Experiment Station, Homestead, Florida

Previous studies of potato yields associated with insect infestations of the potato leafhopper, *Empoasca fabae* (Harr.) and the potato flea beetle, *Epitrix cucumeris* (Harr.), were reported by Wolfenbarger (1936), and by Wolfenbarger and Heuberger (1946). The leafhopper attacks beans in southern Florida, but not potatoes; the flea beetle is not present. Infestations of aphids and of the serpentine leaf miner, however, are usual and are often abundant enough to reduce potato yields. Lack of information on the amount of yield increase resulting from control of these insects led to the present study, which is an evaluation of the association of potato yields with control of aphids and leaf miner.

Aphids, principally the green peach aphids, *Myzus persicae* (Sulz.), were annual pests of the potato plants in southern Florida during the years of observations of this work. Usually a few of the cotton or melon aphid, *Aphis gossypii* Glov., infested the plants, but were generally unimportant. The serpentine leaf miner, *Liriomyza pusilla* (Meig.), or one of the *pusilla* "complex", was very abundant in some seasons. Mines produced by the larvae of this fly were so abundant in some fields in certain years that a flame appeared to have scorched the plants. Occasional colonies of the southern armyworn, *Prodenia eridania* (Cram.), were encountered; other insects were never abundant enough to influence yields.

EXPERIMENTAL PROCEDURES.—The present study was based on records from field plot experiments. Data were taken over a seven-year period, beginning in 1946 and ending in 1953. Altogether, there were 83 sets of data on aphids, leaf mines and potato yields. A consideration of these data is made here with respect to yield as related to variable control of aphids and leaf mines.

Certain factors were alike each year the tests were conducted and are listed as follows:

---

[1] Florida Agricultural Experiment Station Journal Series, No. 229.

1. Tubers from the same lot were planted, fertilized, and cultivated alike in all plots each year.
2. Plots were 12 feet (four rows) wide and 50 feet long.
3. There were four replications of each treatment, and these were randomized in blocks.
4. All pesticides were applied as spray mixtures.
5. A four-row power sprayer was used for all treatments, with from three to five nozzles per row, depending on the size of the plants.
6. Sufficient spray was used to cover the plants, and ranged from 75 to 175 gallons per acre, per treatment application.
7. All insecticides were combined with nabam and zinc sulphate (also hydrated lime from 1946 through the 1949 season) which was used on all plots for the control of the late blight disease.
8. Four counts were made of aphids and of leaf mines in each replicate in each treatment on each count day.
9. Results were recorded from the two inside rows of each plot.
10. Potatoes were harvested and weighed after the plants had died.

Beside seasons, certain factors were unlike or varied each year the tests were conducted. These are listed as follows:

1. A different lot of potatoes was planted each year.
2. Different numbers of fungicide and insecticide applications were made.
3. Different insecticides were tested.
4. Insect infestation or potato leaf injury counts were made on the third to the sixth leaf, usually the fourth leaf from the top of the plant sampled.
5. There were one or two, usually two, days on which aphids and leaf mines were counted each season. These days were usually spaced about a week apart.

Planting dates were near November 25 each year. Harvest dates were in mid-March. Aphid infestations usually began the last week in January. Although some leaf mines became evident in mid-December, they became most abundant in February and March.

The following insecticides were included in the experiments: Aldrin, benzene hexachloride, calcium arsenate, chlordane, DDT, demeton, dieldrin, dilan, endrin, EPN, heptachlor, HETP, isodrin, lead arsenate, lindane, malathion, Metacide, nicotine sulphate, NPD, OMPA, parathion, Perthane (Q-137), Strobane, TDE, TEPP, and toxaphene. Benzene hexachloride cannot be used on potatoes owing to the objectionable off-flavor it induces in the tubers. For this reason, results of benzene hexachloride

and lindane treatments were omitted from consideration in this paper. Although certain treatments—repeated applications of toxaphene to young plants, for example—cause yield reductions, the results are used in this paper. Certain other treatments, such as repeated applications of phosphatic insecticides, may induce yield increases; these are also included. These are accepted as factors which may contribute to the variability of the results.

Population levels of aphids and of the serpentine leaf miner varied somewhat from year to year. No attempt was made to "adjust" for population levels. This factor also undoubtedly contributed to variability of the results.

Averages of the counts of aphids, leaf mines and yields from the non-insecticide-treated, or check, plants are given to show the fluctuations in the different years. These are given in Table 1.

TABLE 1.—AVERAGE NUMBER OF APHIDS AND LEAF MINES PER LEAF AND OF YIEDS OF POTATOES IN CHECK TREATMENTS.

Year	Aphids	Leaf mines	Yield, bu./acre
1946-47	72	25	249
1947-48	52	9	246
1948-49	89	11	316
1949-50	128	14	376
1950-51	122	too few to count	361
1951-52	42	23	218
1952-53	33	11	347

STATISTICAL PROCEDURES.—Preparation of the data for the regression studies was made as follows: Observed numbers of aphids and leaf mines per leaf were transformed to percentages of control according to the formula given by Abbott (1925). Observed yield data were transformed to increase or decrease from the check. These changes were made for all data owing to the variations of actual numbers.

Multiple regression computations of aphids, leaf mines and yields were made following the examples given by Snedecor (1940). A multiple correlation, $R = 0.51$, was obtained which is highly significant. Semi-logarithmic transformations gave a multiple correlation, $R = 0.50$, which is also highly significant. Transformations of all data to logarithmns and calculation of a multiple correlation gave a non-significant "R" value. Further calculations were made on untransformed values.

RESULTS.—A multiple regression formula of

Expected Yield, bu./A. = 0.59 (percentage aphid control) + 0.15 (percentage mines control) — 8.12 was obtained.

An "F" value of 13.61 for variation due to regression is significantly greater than the variation unexplained by regression. A simple regression formula pertaining to aphid control was calculated. It is

Expected Yield, bu./A. = 0.60 (percentage aphid control) — 15.74.

The regression coefficient is highly significant. A simple regression formula pertaining to control of serpentine leaf mines was calculated. It is

Expected Yield, bu./A. = 0.21 (percentage control of leaf mines) — 17.82.

The regression coefficient was not significant.

Through the use of the above regression formula Expected Yield increases were calculated for selected percentages of control. These are given in Table 2, and cover the six-year period of experimentation in which both aphids and leaf mines were prevalent.

TABLE 2.—POTATO YIELDS RELATED TO CONTROL OF APHIDS AND LEAF MINES FOR THE SIX-YEAR PERIOD.

Percentage of Control	Yields, bu./A. increase from control of		
	Aphids and leaf mines	Aphids	Leaf mines
25	10	0	23
50	29	15	28
75	47	30	33
90	59	39	36
95	62	42	37
98	64	43	38
100	66	45	39

Average aphids per leaf on check, 69; average leaf mines per leaf on check, 16; average yield on check, 292.

In the 1951-52 season only aphid infestation and yield data were taken (there were never enough leaf mines on which to make counts). A linear regression was computed from these data and gave the formula

Expected Yield, bu./A. = 1.74 (percentage aphid control) — 108.01.

The regression coefficient was highly significant. Through calculation with the above regression formula Expected Yield increases were calculated for selected percentages of control. These are given in Table 3.

TABLE 3.—POTATO YIELDS RELATED TO APHID CONTROL IN THE 1950-51 SEASON.

Percentage Control	Yield, bu./A. increase
65	5
75	23
90	49
95	57
98	62
100	66

Average aphids per leaf on check, 122.
Average yield, bu./A. of check, 361.

In the 1952-53 season the phosphatic insecticides gave practically perfect aphid control but varying degrees of leaf mines reduction. The data obtained were used for computation of regression of yield on leaf mines control. The formula obtained was

Expected Yield, bu./A. = 0.49 (percentage control of leaf mines) + 33.20.

The regression coefficient was statistically significant. Through calculations with the above regression formula Expected Yield increases were determined for selected percentages of control. These are given in Table 4.

TABLE 4.—POTATO YIELDS RELATED TO LEAF MINES CONTROL IN THE 1952-53 SEASON.

Percentage of Control	Yield, bu./A. increase
25	45
50	58
75	70
90	77
95	80
98	81
100	82

Average leaf mines per leaf on check, 11.
Average yields, bu./A. of check, 347.

DISCUSSION.—Aphid control resulted in greater increases of potato yields over a six-year period than did control of leaf mines. The following reasons are given for this conclusion: closer relationships of aphid control and yield increases were found than of leaf mines control and yield. The multiple regression coefficient for aphid control, 0.59, is nearly four-fold greater than that for leaf mines control, 0.15. Simple regression curves showed that yield increases on aphid control were steeper than yield increases based on control of leaf mines.

SUMMARY.—Regression studies of results from spraying potato plants were made to associate yields with degrees of aphid and leaf mines control. These indicated more rapid yield increases with aphid control than with leaf mines control. Yield increases of 62 and 64 bushels resulted from 95 and 98 percent control, respectively, of aphid and leaf mines over a six-year period.

LITERATURE CITED

Abbott, W. S. 1925. A method of computing the effectiveness of an insecticide. Jour. Econ. Ent. 18: 265-267.

Snedecor, George W. 1940. Statistical methods, 3rd ed. Iowa State College Press, Ames.

Wolfenbarger, D. O. 1936. Insect and disease evaluations in potato experiments. Jour. Econ. Ent. 29: 187-189.

———————— and J. W. Heuberger. 1946. Potato yields from different potato leaf hopper densities. Amer. Potato Jour. 23: 389-395.

MALATHION AND DIAZINON FOR CONTROL OF HOUSE FLIES IN NORTH FLORIDA CATTLE BARNS [1]

F. E. GUTHRIE and F. S. BAKER, JR.[2]
North Florida Experiment Station

Although house flies resistant to DDT were present in North Florida by 1950, other chlorinated hydrocarbons, especially toxaphene, gave adequate control until recently. Early in the 1952 season, resistance to toxaphene was indicated, and by the end of the season none of the chlorinated hydrocarbons were satisfactory. Malathion, a phosphatic insecticide of low mammalian toxicity, gave some promise for control, and more recently, diazinon has indicated greater effectiveness on resistant flies than any other material.

In the shade tobacco district of Florida, the greatest need for house fly control is in steer feeding barns. Most of the steers in this section are fattened on rations which include molasses. They are fed in barns to preserve the manure which is used on shade tobacco fields. Steers remain in these barns for periods of 4 months or longer, and there is an accumulation of manure which makes an excellent medium for fly development. Flies soon become so abundant that feed troughs are literally black with them, causing considerable annoyance to the cattle and to personnel engaged in the feeding operation.

The results of tests conducted with malathion and diazinon in steer feeding barns during 1953 are reported herein.

REVIEW OF LITERATURE

The U.S.D.A. (P.M.A.) has accepted the use of malathion as baits and sprays to control house flies in dairy barns. The manufacturer (1953) reports that control for 10-21 days may be expected, but no experimental studies on housefly control have been found in the literature. Dahm (1952) showed that this compound can be safely applied to cattle and will give control of horn flies for approximately four days.

Hansen and Bartley (1953) showed diazinon to be effective for 3-10 weeks, apparently depending upon resistance to other insecticides and local conditions.

---

[1] Florida Agricultural Experiment Station Journal Series, No. 238.
[2] Assistant entomologist and assistant animal husbandman, respectively.

METHODS

Thirteen barns were selected for the tests. The barns had heavy fly populations (index 4 as defined below) and were representative of the several types used in Gadsden and Jackson counties. Wooden surfaces were sprayed to the point of run-off with a power sprayer operated at 250 pounds pressure. Hallway floors were also sprayed, but feed and water troughs were covered during the spraying operation. Cattle remained in the barn during spraying but were not sprayed directly. Sprays were prepared from 25 percent wettable-powder or 50 percent emulsifiable concentrates. Baits were prepared by mixing equal parts of emulsifiable malathion and molasses in water and applying the material with a sprinkling can to concrete floors and to sacks.

The fly population index was obtained by estimating the number of flies found in 20 feet of feed trough at each of five different locations in the barn, as follows:

1. 0-10 flies/20 feet of feed trough (scarce)
2. 10-40 flies/20 feet of feed trough (light)
3. 40-100 flies/20 feet of feed trough (moderate)
4. >100 flies/20 feet of feed trough (heavy)

Fly estimates were made immediately before spraying and at frequent intervals thereafter to determine the effectiveness of the various treatments. When fly populations again became heavy (index 4) and flies were annoying the cattle, barns were re-sprayed in the malathion tests, but there was no opportunity to make repeated applications of diazinon.

RESULTS AND DISCUSSION [3]

The results of all tests are summarized in Table 1.

MALATHION SPRAYS.—This table shows that malathion is effective for about two weeks; 0.4-0.5 percent remained effective for nearly as long as 1.0 percent sprays. This may be accounted for by the fact that malathion residues are known to dissipate rapidly, and an excessive amount at a single spraying would not greatly extend the residual effectiveness.

These data indicate that results with malathion sprays prepared with wettable-powder were slightly better than those ob-

[3] Since this paper went to press, King *et al* (1953) reported that malathion gave 30 days' and diazinon 21 days' control of house flies in dairy barns. (King, H., G. Guyer, and N. P. Ralston. 1953. Fly control in dairy barns. Quart. Bul. Mich. Agr. Exp. Sta. 36: 179-186.)

TABLE 1.—COMPARATIVE EFFECTIVENESS OF MALATHION AND DIAZINON FOR THE CONTROL OF HOUSE FLIES IN NORTH FLORIDA CATTLE BARNS HAVING HEAVY INITIAL POPULATIONS.

Material	Amt. 100 gals.	% Conc. by Wt.	No. Tests	Average Fly Index,* Days After Treatment (Within 1 Day) 1	3	7	10	14	28	35	42	No. Days Fly Protection Range	Average
Malathion (50% emul.)	1 gal.	0.625	3	1+	2—	3	4	—	—	—	—	8-10	9
Malathion (50% emul.)	2 gal.	1.25	3	1+	2	2+	3	3+	—	—		12-17	15
Malathion (25% W.P.)	8 lbs.	0.25	5	2—	2+	3+	3+	—	—	—		6-11	8
Malathion (25% W.P.)	12 lbs.	0.375	6	1+	1+	2+	3—	4—	—	—		10-16	12
Malathion (25% W.P.)	16 lbs.	0.5	3	1+	2	2+	3+	—	—	—		10-12	11
Malathion (25% W.P.)	32 lbs.	1.0	3	1+	1+	2+	2+	3+	—	—		14-17	15
Malathion (Molasses bait)		0.625	3	3	4	—	—	—	—	—		1-2	1
Diazinon (25% W.P.)	16 lbs.	0.5	1	1	1	2	3	3+				-	15
Diazinon	32 lbs.	1.0	6	1	1	1	1	1+	2	3	3+	34-54	43

* 1—Scarce. 2—Light. 3—Moderate. 4—Heavy.

tained with emulsions, especially at the lower concentrations. Due to the further advantage in safety, it appears that wettable-powder sprays would be preferable.

Preliminary tests in other barns where the initial fly population was only moderate (index 3), or where the conditions for fly breeding were not as favorable, showed that malathion may give effective control for about three weeks.

MALATHION BAITS.—Experiments made with malathion bait applied to concrete floors or sacks in steer feeding barns were disappointing. Although the experiments were striking in that large numbers of dead flies were found on floors or treated sacks, there were still large numbers of living flies in feeding troughs and throughout the barns. It is estimated that fly populations were never reduced by more than half. One important factor causing lack of control in steer feeding barns may be that molasses in the feeding troughs is as attractive to flies as is the poisoned bait.

The use of poisoned bait gave satisfactory results in preliminary tests in dairy barns and chicken houses where other attractants were not present.

DIAZINON SPRAYS.—This treatment at 1 percent was effective for about six weeks in the experimental barns, or at 0.5 percent for about two weeks. General observations indicated knockdown was better with diazinon than with malathion.

The use of diazinon is not recommended commercially, as yet, due to the lack of toxicological data. Preliminary experiments were made to learn something of its safety by spraying two quarts of a 1 percent solution directly on each of four yearling heifers. These animals were examined at weekly intervals for four months and no external symptoms were evident. In addition, no toxic symptoms were shown to the personnel engaged in the spraying operation at any time.

SUMMARY

Tests were conducted with malathion and diazinon to determine their effectiveness in the control of extremely heavy house fly populations in cattle barns. One percent malathion gave good results for two weeks and 0.5 percent malathion for nearly the same length of time. Malathion sprays prepared from wettable-powder were slightly more effective than those prepared from emulsifiable concentrates. Malathion-molasses baits

applied to floors and sacks did not effectively control houseflies in steer feeding barns, although many dead flies could be found. Diazinon was very promising, giving highly effective control for a period of four weeks after spraying, and satisfactory control for six weeks.

LITERATURE CITED

Anonymous. 1953. American Cyanamid Company's News-Letter. Vol. 2, No. 5, August.

Dahm, P. A. 1952. Recent work carried out with phosphates. Proc. 7th Ann. Meeting North Central States A. A. E. E.: 75-76.

Hansen, E. J., and C. E. Bartley. 1953. Three new insecticides for housefly control in barns. Jour. Econ. Ent. 46: 372-374.

ENTOMOLOGICAL NOMENCLATURE AND LITERATURE. 3RD ED. by W. J. Chamberlin. v + 141 p. 1952. Wm. C. Brown Co., Dubuque. Price for paper bound copy $3.50.

A highly useful book for entomologists working in all areas of the subject has been revised and enlarged in this third edition. The book deals first with nomenclature giving the background for its proper use. The international rules are given as well as a discussion of the subject. The second part of the book deals with entomological literature, giving sources, methods of preparing bibliographies, and a list of the more important works on each of the orders of insects. The last section includes suggestions and aids on preparations of scientific publications. This revised edition of Dr. Chamberlin's book is one that should be in the hands of all entomologists.—L. B.

PRINTING

FOR ALL PURPOSES

Carefully Executed ● **Delivered on Time**

PEPPER PRINTING COMPANY

GAINESVILLE - - - - - - - - - - **FLORIDA**

Check these ORTHO Advantages:

1. Expert practical advice by experienced *ORTHO* Fieldmen.

2. Quick delivery and fresh material from local plants.

3. Finest research facilities assure latest information on new pest controls.

4. *ORTHO* Field News Letters give complete technical data on local pest problems. Write to be placed on mailing list.

5. *ORTHO* labels are guaranteed for ingredient contents.

6. Quality products from the control laboratories working 'round the clock to assure accuracy of ingredients.

ORTHO
SCIENTIFIC PEST CONTROL

CALIFORNIA SPRAY-CHEMICAL CORP.
P. O. Box 1231, Orlando, Florida

World leader in scientific pest control

CONCERNING THE FLORIDIAN SPECIES OF FULVIUS (HEMIPTERA, MIRIDAE)

Roland F. Hussey
Department of Biology, University of Florida

The genus *Fulvius* Stål, 1862:322 (type *anthocorides* [1] Stål, loc. cit.), with nearly forty known species, occurs in all the major zoogeographical realms except the Australian, but its distribution is essentially tropical. A single species is found in southern Europe, and only three are known from eastern North America. Two of these are definitely nearctic and are widely distributed. *Fulvius imbecilis* (Say, 1832) has been reported from Canada and the eastern states, south to northern Florida. *Fulvius brunneus* (Provancher, 1872), ranging across the continent, has been known heretofore from Canada and the northern half of the United States, and is here reported from extreme southwestern Georgia. In this paper *Fulvius atratus* Distant, 1883, a synonym of *F. quadristillatus* (Stål, 1860), is removed from the United States list, and *Fulvius brevicornis* Reuter, 1895, is added in its place.

Fulvius atratus Distant has twice been reported from the United States, but both these records seem erroneous. Uhler (1894:192), when listing it from Grenada, wrote, "In the United States it frequents fungi in damp, shady borders of woods, and flies freely in the sunshine." Until very recently I had suspected that this statement might be referable to *F. imbecilis* (Say), which in 1894 was still an unknown species, unrecognized since Say's original description. But Dr. R. I. Sailer has most obligingly checked the material standing in the Uhler collection under the name *Fulvius atratus,* and he informs me that these specimens, from Maryland and the District of Columbia, are in reality *Fulvius brunneus* (Provancher).

Barber (1914:500) reported *Fulvius atratus* Distant from Biscayne Bay, in the vicinity of Miami, Florida, on the basis of specimens collected by Mrs. Annie Trumbull Slosson and determined for her by Van Duzee. This, the only definite United States locality published for the species, was picked up and

[1] This spelling, used by Stål, is grammatically and orthographically correct, yet I believe that Distant (1883:281) and Bergroth (1920:75) are the only authors since Stål to write the name *anthocorides.* Other authors have employed the unnecessary emendation *anthocoroides,* first used by Walker (1873:160).

repeated by Blatchley (1926:879). The two specimens from Mrs. Slosson's collection are now in the American Museum of Natural History, and I have been able to examine them through the kind cooperation of Dr. Mont A. Cazier. They differ widely from Distant's description and figure of *atratus*, and in fact are *Fulvius brevicornis* Reuter (1895:138), a species not known before from the United States.

I have seen four other specimens of *Fulvius brevicornis* from Florida, all taken at light in houses where presumably they had been able to pass through window screens. Two were collected at Gainesville, October 17, 1923, by T. H. Hubbell, and are now in the University of Michigan Museum of Zoology. The two others were taken by me at Lakeland, November 14, 1948, and July 12, 1949, and are in my collection.

This species was first described by Reuter (1875:28) as *Teratodella anthocoroides*. In 1895 he sank *Teratodella* as synonymous with *Fulvius*, and renamed the species *brevicornis* on the ground that *anthocoroides* was a preoccupied name in *Fulvius*. The original description was based on one specimen taken on shipboard at Rouen, France, and thought to be adventive from Senegal. Indeed, *F. brevicornis* is now known to occur in Senegal and elsewhere in tropical Africa and Asia, and has been reported as introduced into northern South America, the West Indies, and Central America. Mrs. Slosson's specimens from Biscayne Bay have no date of collection on their labels, but it is safe to say that *F. brevicornis* was in the Miami area about fifty years ago. Dr. Hubbell's pair from Gainesville, more than 300 miles north of Biscayne Bay, show that the species was present here two decades later. Probably it entered Florida from the Antilles.

Distant described the second antennal segment of *Fulvius atratus* as being wholly black. This caused both Reuter (1895) and Poppius (1909) to maintain it as a distinct species in their keys to *Fulvius;* and Blatchley (1926) used this character alone to distinguish it from *brunneus* and *imbecilis*. These three authors knew *atratus* only from Distant's description and figure. In none of their keys do the Biscayne Bay specimens, with their bicolored second antennal segments, run out to *F. atratus*. Carvalho (1952:3), who examined both the types, recently synonymized *atratus* Distant with *quadristillatus* (Stål), another species whose second antennal segment is conspicuously bicolored. It seems, therefore, that Distant's description was faulty as regards the color of the antennae. However, one of my Paraguayan

specimens of *quadristillatus* has one antenna (but not the other) so discolored as to appear at first glance blackish throughout its length.

Fulvius imbecilis (Say) has been recorded from Gainesville, Florida, by Knight (1927:37). The Michigan Museum has five specimens of this species, also from Gainesville, taken by Dr. Hubbell on October 24, 1924. I did not find *F. imbecilis* at Lakeland in my six years of residence there.

Fulvius brunneus (Provancher) undoubtedly occurs in northernmost Florida, at least, though it is unreported and I have seen no specimens actually collected within the state. Two females of *F. brunneus* were taken by Dr. Hubbell, June 8, 1953, in Decatur County, Georgia, within eight hundred feet of the Georgia-Florida boundary line and scarcely a quarter-mile from Chattahoochee, Florida. They were caught in a baited malt trap, set out for nocturnal Orthoptera, in a ravine which opens near the eastern end of Jim Woodruff dam on the Apalachicola River. This mode of capture suggests that the brachypterous females of *F. brunneus* are active on warm nights and run about over the ground in moist, heavily wooded situations. It is worth noting that this same trap, which had stood uninspected for several days, yielded numerous adults and nymphs of the lygaeid *Ozophora picturata* Uhler, as well as a single specimen of a mezirine aradid which will be reported elsewhere as a new addition to the United States fauna.

The following key, based on those of Reuter and of Poppius, will serve to separate the four species of *Fulvius* discussed above.

1. Marginal white spot of hemelytra on outer apical angle of corium, before the cuneal fracture; cuneus not bicolored; clavus and corium both whitish on basal portion; antennae short and relatively stout, first segment subequal in length to interocular width of vertex, second segment not longer than basal width of pronotum; small species, length 3 mm. (♂) ..... *brevicornis* Reuter

   Marginal white (or yellowish) spot on basal half of cuneus, behind the cuneal fracture; apical part of cuneus dark brown or reddish; first antennal segment as long as or longer than width of vertex plus one eye 2

2. Scutellum pale at tip and with a pale mark each side; second antennal segment most commonly entirely pale, rarely darkened at very base or on middle; clavus and corium both broadly whitish on basal portion; females obovate, brachypterous, with reduced membrane ..... *brunneus* (Provancher)

   Scutellum uniformly dark colored; second antennal segment dark brown to black on basal three-fifths or more, the apical part whitish; clavus without pale area on basal part; corium with traverse whitish or

yellowish bar near middle, narrowed inwardly but not invading clavus; females not brachypterous 3

3. Second antennal segment very plainly longer than basal width of pronotum, first segment as long as width of head including both eyes; vertex (♂) about two-thirds wider than an eye, eyes elongate-oval as seen from above; head in side view nearly one-half longer than its height at base; more slender species ..... *imbecilis* (Say)

Second antennal segment subequal to (♂) or shorter than (♀) basal width of pronotum, first segment subequal to width of vertex plus one eye; vertex (♂) less than one-half wider than an eye, eyes nearly orbicular as seen from above; head in side view only slightly longer than its height at base; body broader, more robust. [Not in U. S.] ..... *quadristillatus* (Stål)

REFERENCES

Barber, H. G. 1914. Insects of Florida. II. Hemiptera. Bull. Amer. Mus. Nat. Hist. 33(31): 495-535.

Bergroth, E. 1920. List of the Cylapinae (Hem., Miridae) with descriptions of new Philippine forms. Ann. Soc. Ent. Belg. 60: 67-83.

Blatchley, W. S. 1926. Heteroptera or true bugs of eastern North America. Indianapolis. 1116 pages.

Carvalho, José C. M. 1952. Neotropical Miridae, L: On the present generic assignment of the species in the Biologia Centrali-Americana (Hemiptera). Bol. Mus. Nac., Rio de Janeiro, n. s., Zool. No. 118: 1-7.

Distant, W. L. 1883. In: Biol. Centr.-Amer., Hem.-Het. 1: 281-282, Pl. 27, f. 18.

Knight, H. H. 1927. Notes on the distribution and host plants of some North American Miridae (Hemiptera). Canad. Ent. 59(2): 34-44.

Poppius, B. 1909. Zur Kenntnis der Miriden-Unterfamilie Cylapina Reut. Acta Soc. Sci. Fennicae 37(4): 1-35.

Reuter, O. M. 1875. Genera Cimicidarum Europae disposuit. Bih. Svensk. Vet.-Akad. Handl. 3(1): 1-66.

———. 1895. Zur Kenntniss der Capsiden-Gattung Fulvius Stål. Ent. Tidskr. 16(2): 129-154.

Stål, C. 1860. Bidrag till Rio Janeiro-traktens Hemipter-fauna, I. K. Svensk. Vet.-Akad. Handl. 2(7): 1-84.

———. 1862. Hemiptera mexicana enumeravit speciesque novas descripsit. [3d installment.] Entom. Zeitg., Stettin, 23: 289-325.

Uhler, P. R. 1894. On the Hemiptera-Heteroptera of the island of Grenada, West Indies. Proc. Zool. Soc. London, 1894: 167-224.

Walker, F. 1873. Catalogue of the specimens of Hemiptera Heteroptera in the collection of the British Museum. Part VI. 210 pages.

NOTES ON THE GENUS METALEPTOBASIS WITH THE DESCRIPTION OF A NEW SPECIES FROM PANAMA (ODONATA: COENAGRIIDAE)

Robert B. Cumming
Department of Biology, University of Florida

While on a collecting trip to the Canal Zone and the Republic of Panama in the summer of 1950, I visited the Canal Zone Biological Area, Barro Colorado Island, several times. On July 22, 1950, in collecting on one of the back trails at a small rain pond, I found that a long, dainty, orange-yellow damselfly with prominent mesothoracic horns was quite abundant. I collected a small series including three pairs in tandem without realizing that these specimens represented an undescribed species of *Metaleptobasis*. Some time later an additional male was taken in the Pacora region of the Republic of Panama, and still later another male was taken at the Canal Zone Experimental Gardens at Summit C. Z. In view of the dearth of *Metaleptobasis* material in collections, and the scanty knowledge of the zoogeographical and phylogenetic relationships within the genus, a study of this material adds substantially to our understanding of the genus. It therefore seemed desirable, along with the description of this new species, to review the previous work on the genus and to investigate the relationships which might be suggested by the information available to date.

The genus *Metaleptobasis* was set up by Dr. Phillip P. Calvert in "Biologia Centrali-Americana, Odonata," (1907:386) for his new species, *M. bovilla*, described from a single male from Nicaragua and a single female from Guatemala. Generic characters were listed which would separate the genus from its nearest relative, *Leptobasis*. Of these the following still apply:

> M_2 arising nearest the fifth or sixth postnodal on the hind wings, the sixth or more remote on the front wings; tarsal claws toothless; superior appendages of the male not bent down almost at a right angle in their apical half; genital valves of the females not reaching far beyond the level of the tips of the abdominal appendages.

When he originally established the genus, Calvert (*loc. cit.*) pointed out that it would also include *Leptobasis diceras* Selys, and suggested that it might also include the other species asso-

ciated therewith by de Selys (*L. bicornis* and *L. quadricornis.*) He then (Calvert, 1909:197-200), in a further discussion of *Metaleptobasis,* definitely included in the genus *L. bicornis* Selys and described a new species, *M. cornicauda.* Calvert suggests here that the genus would probably also include *L. macilenta* Rambur [1] which he lists as the closest relative of his *cornicauda.* This brought the number of species definitely ascribed to the genus to four with two more which had been suggested as probably *Metaleptobasis.* The genus received further additions when E. B. Williamson (1915:601-608) described three new species from Trinidad, *M. brysonima, M. mauritia,* and *M. manicaria.* Williamson (1916) later corrected this first name to *byrsonima,* as the generic name of the plant after which it is named is so spelled. It is evident from his correction that the error is not of a typographical nature. I do not, therefore, believe that the correction is valid according to the current interpretation of the rules, and I shall retain the original spelling of the name in this paper. Another species was added by Ris (1918:130) when he described *M. foreli* from Colombia, and still another in the same year by Sjöstedt (1918:19-21) when he described *M. amazonica* from western Brazil. Another species was added by Calvert (1948:60-61) when he described *M. tetragena* from Kartabo, British Guiana. It is again strongly implied by Calvert in this paper that *L. quadricornis* Selys is actually a *Metaleptobasis* when he lists it as the closest relative of *tetragena.* Ten species have then actually been called *Metaleptobasis* in the literature and two others, *L. quadricornis* Selys and *L. macilenta* Rambur, have been suggested by Calvert as likely *Metaleptobasis.* Both of these species are to my knowledge still only known from the single specimens from which they were described. In the descriptions characters which would definitely separate *Metaleptobasis* from *Leptobasis* are not given. However, on the basis of other characters each of these species seems to be the closest relative of a species which is unquestionably *Metaleptobasis.* I therefore include these two species in this paper as *Metaleptobasis* with the hope that material will come to light which will settle the matter one way or the other.

My discovery of a new species of this genus from Panama brings the number of known species to thirteen and helps to fill what was previously a large gap in the known distribution of *Metaleptobasis.*

---

[1] In Selys (1877:106, reprint p. 12).

Metaleptobasis westfalli sp. nov.

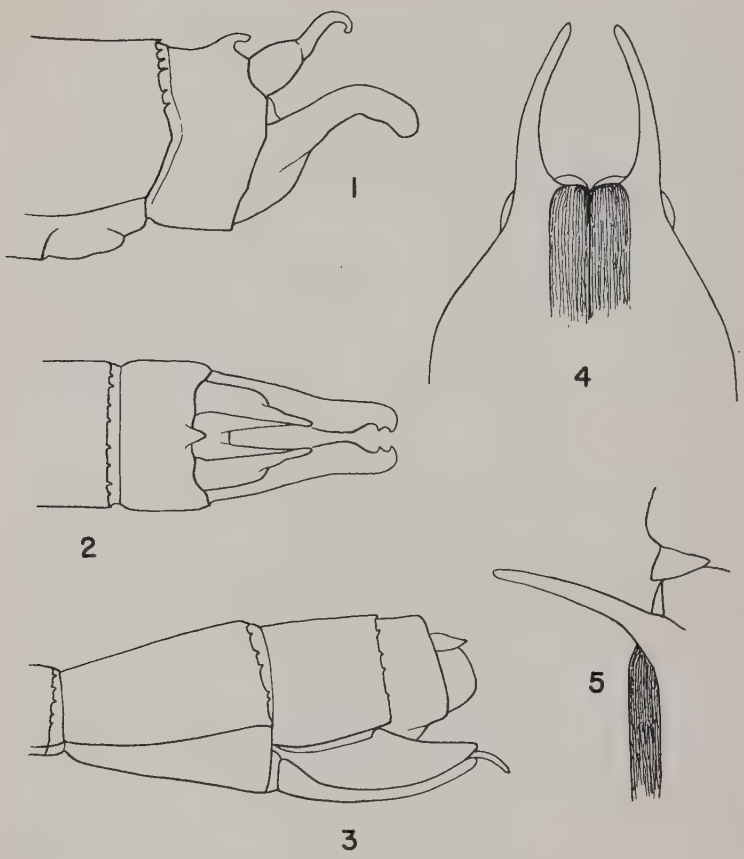
M. westfalli is more closely related to *brysonima* than any other known species, but it may be easily separated from *brysonima* on the basis of the following characters: The mesothoracic horns of *westfalli* are convergent throughout most of their length, while those of *brysonima* diverge and are farthest apart at the tips. The superior abdominal appendages of *brysonima* in dorsal view are curved laterad at the extreme tips to form hooks, while those of *westfalli* are straight at the tips. *M. brysonima* is also somewhat smaller than *westfalli*. *M. westfalli* is also closely related to *bovilla*, from which it can be separated by the shape of the mesothoracic horns and the shape of the abdominal appendages.

MALE: *Head.* Dorsal surface of the head black; orange behind and with some faint brown markings on the frons and vertex. Labrum dark flesh color with the dorsal and lateral borders edged in dark brown. Labium yellow.

Thorax. Generally bright orange with lighter yellowish shades ventrally and becoming darker dorsally with a black or metallic green middorsal stripe about 0.5 mm. wide. Mesothoracic horns light in color, becoming dark at the tips. They are slender, sharp pointed and convergent throughout most of their length so that the tips are quite close together. There is some variation in the form of the horns in the series of eight males which I have. Five of them approach the drawings of the horns (figs. 4 and 5) very closely. In two specimens, the tips of the horns are closer together and almost touch. In one specimen the tips of the horns actually cross. Wings hyaline; important venational characters summarized in the table.

Abdomen. Segment one yellow with a narrow brown line around its posterior border. Segment two yellow anteriorly becoming brown posteriorly. Segments three, four, and five yellow ventrally, each with a yellow spot on the lateral surface of the anterior end, dark brown dorsally and laterally; each segment becoming successively darker. Segments six through ten dark brown with yellow markings on the ventral surface. Abdominal appendages light brown proximally, becoming dark brown to black distally, shaped as figured.

FEMALE: Differs from the male as follows: Colors generally more subdued. The thorax in two of my three specimens is much darker than the male with which it is associated and shows traces of a thoracic color pattern. This pattern may be an artifact of drying as it is not constant where it occurs and in one of my three females does not occur at all. With respect to color this third female is almost identical with the male with which it is associated. The mesothoracic horns of the females seem to be much more variable than those of the males. In one of my three specimens, the horns are missing entirely, being represented by small stumps. In another of the females there is an abnormality in that about one-third of the right horn is bent back on itself in a tight elbow, and in the third specimen the right horn is bent forward much more than



All figures are of *Metaleptobasis westfalli* sp. nov.

Fig. 1. Male abdominal appendages, profile view.
Fig. 2. Male abdominal appendages, dorsal view.
Fig. 3. Female, tip of abdomen, profile view.
Fig. 4. Mesothoracic horns of male, dorso-caudal view.
Fig. 5. Mesothoracic horns of male, profile view, from right side.

its fellow of the opposite side. In the two females which have horns it is apparent that, aside from the abnormalities, the horns are very similar in basic pattern to those of the males. It may be in this genus that horn characters are in general more variable in the females than in the males. There is no question about the association of all of these females with this species. They were all taken in tandem and in most important structural characters resemble each other closely. This series of three females represents the greatest number of known specimens of that sex reported in the literature for any one species of the genus except *M. mauritia* Williamson. Geijskes (1932) described three females of this species, and one of *M. manicaria* Williamson, basing his determinations chiefly on wing venation. The females of five other species are known from a single specimen; of one species from two specimens; and four species, not at all. The genital valves are figured and are quite constant in the specimens I have. Measurements and important venational characters are given in the table.

HOLOTYPE (male) and ALLOTYPE (female). — Barro Colorado Island, Panama Canal Zone; July 22, 1950; (R. B. Cumming), [University of Michigan, Museum of Zoology].

PARATYPES (7 ♂♂ and 2 ♀♀ all taken by the author) as follows:

PANAMA CANAL ZONE. Barro Colorado Island: 1♂, 1♀, July 22, 1950, [USNM No. 62,060]; 1♂, July 22, 1950, [M.J.W.Jr.]; 1♂, July 22, 1950, [FSM]; 2♂♂, 1♀, July 22, 1950, [R.B.C.]. The Canal Zone Experimental Gardens, Summit, C. Z.: 1♂, Sept. 1, 1950 [R.B.C.].

REPUBLIC OF PANAMA. 5 mi. W. of Pacora, Prov. de Panama: 1♂, Aug. 26, 1950 [R.B.C.].

TABLE OF COUNTS AND MEASUREMENTS

Each specimen is identified by my original catalogue number, locality of capture, and place of deposition. All measurements are in millimeters. The origin of the M_2 is with respect to the postnodals. Abbreviations: RBC is Robert B. Cumming; MJW is Minter J. Westfall, Jr.; UMMZ is Univ. of Michigan, Museum of Zoology; USNM is U. S. National Museum; FSM is Fla. State Museum.

A KEY TO THE KNOWN MALES OF THE GENUS METALEPTOBASIS

The following key is designed to separate the known males of the genus. It does not seem practical to include the females in a key at this time; the females of four of the thirteen known species remain unknown (*brysonima, cornicauda, diceras,* and *macilenta*). Also the best indicator of phylogenetic relationships on the basis of the present knowledge seems to be the form of the male abdominal appendages, and characters involving them are used a great deal in this key. *M. foreli, quadricornis,* and *tetragena* are not included in this key as each of these species is known from a single female specimen. These three species seem

TYPE SERIES: COUNTS AND MEASUREMENTS

Cat. No.	Sex	Locality	Deposited	Hind Wing	Front Wing	Abdomen	Postnodals Hind Wing Left	Postnodals Hind Wing Right	Postnodals Front Wing Left	Postnodals Front Wing Right	Origin of M_2 Hind L.	Origin of M_2 Hind R.	Origin of M_2 Front L.	Origin of M_2 Front R.
RBC 50	♂	BCI	UMMZ*	20.0	20.9	35.6	12	12	13	13	6	6	6	6
RBC 52	♂	BCI	USNM	22.0	22.3	38.7	12	12	12	12	6	5	6	6
RBC 54	♂	BCI	RBC	21.6	22.3	39.1	13	13	13	13	6	6	6	6
RBC 56	♂	BCI	MJW	20.9	21.5	37.9	12	12	13	13	6	6	6	6
RBC 57	♂	BCI	FSM	20.9	21.5	35.8	13	14	14	14	6	6	6	6/7
RBC 58	♂	BCI	RBC	20.9	21.5	37.3	14	13	14	14	6	6	6	6
RBC 59	♂	Pacora	RBC	20.4	21.0	37.5	11	12	12	12	6	6	6	6
RBC 60	♂	Summit	RBC	22.3	22.7	39.3	12	12	14	13	7	6	7	7
Mean for the ♂ ♂				21.12	21.71	37.65	12.44		13.06		6.08			
RBC 51	♀	BCI	UMMZ*	23.3	23.9	38.7	12	12	13	13	6	6	6	6
RBC 53	♀	BCI	USNM	22.7	23.4	35.8	12	12	12	13	6	6	6	6
RBC 55	♀	BCI	RBC	21.5	22.3	35.7	12	12	12	12	6	7	6	6
Mean for the ♀ ♀				22.5	23.2	36.73	12.0		12.5		6.08			

* *Holotye* ♂ and *Allotype* ♀.

to form a natural group which is discussed below under phylogenetic relationships. *M. bicornis* is separated off first on the basis of its rather unusual mesothoracic horns, but this is a matter of expedience rather than an indication of actual degree of relationship. The only known male of *bicornis* lacks its last four abdominal segments. Otherwise the key should be indicative of actual relationships within the genus.

1 Each mesepisternum with a slender straight horn directed laterad and hardly at all cephalad or dorsad ..... *bicornis*
1′ Each mesepisternum with a horn directed dorsad and cephalad or with the mesothoracic horns entirely absent 2
2 Superior abdominal appendages longer and extending farther caudad than the inferiors (*diceras* group) 3
2′ Inferior abdominal appendages longer and extending farther caudad than the superiors (*bovilla* group) 5
3 Mesothoracic horns present ..... *diceras*
3′ Mesothoracic horns absent 4
4 Superior abdominal appendages thicker at the bast than elsewhere. Postnodals 12-13 ..... *macilenta*
4′ Superior abdominal appendages in dorsal view each of subequal width in the proximal two-thirds and widened in the distal third, especially on the mesial side. Postnodals 14-16 ..... *cornicauda*
5 Superior abdominal appendages in dorsal view, long, gently curved, and subequal in width for their entire length; in profile view, extending beyond the basal two-thirds of the inferiors (*manicaria* subgroup) 6
5′ Superior abdominal appendages in dorsal view, over twice as wide at their bases as in their distal third; in profile view, not extending beyond the basal two-thirds of the inferiors (*bovilla* subgroup) 8
6 Superior abdominal appendages in profile view, slender, curved down at their apices to form sharp hooks ..... *amazonica*
6′ Superior abdominal appendages in profile view, stout and straight with rounded tips 7
7 Middorsal thoracic stripe black and about 0.5 mm. wide. Mesothoracic horns in profile view of subequal width for their entire length. Superior abdominal appendages in profile view shorter than segment 10 measured along the dorsal surface including the apex ..... *mauritia*
7′ Middorsal thoracic stripe metallic green and 0.25 mm. wide or less. Mesothoracic horns in profile view widest subapically. Superior abdominal appendages in profile view longer than segment 10 measured along the dorsal surface including the apex ..... *manicaria*
8 Mesothoracic horns stout, each subparallel with its fellow of the opposite side for half of its length, then strongly diverging and curving laterad to a rounded tip ..... *bovilla*
8′ Mesothoracic horns slender, with no strong divergence at the apices and with sharp tips 9
9 Mesothoracic horns gently diverging throughout their length, farthest apart at their tips. Superior abdominal appendages in dorsal view curving outward at the extreme tips to sharp points directed straight laterad ..... *brysonima*

9′ Mesothoracic horns gently converging throughout most of their length, quite close together at their tips. Superior abdominal appendages in dorsal view with no lateral divergence at the tips ..... *westfalli*

PHYLOGENETIC RELATIONSHIPS

Several clear-cut groups can be recognized in *Metaleptobasis* on the basis of the morphology of the known species. While I hesitate to propose taxonomic categories with such meager material available, I feel that these suggested relationships should be pointed out. I shall therefore propose a hypothetical grouping within the genus, which can be tested with information as it becomes known. The shape of the abdominal appendages in the males seems to offer indications of phylogenetic relationship in nine of the thirteen species. One of the species for which this evidence is not available is *bicornis* in which the only male known lacks its last four abdominal segments. The affinities of this species within the genus remain obscure, and they will not be considered in this discussion. Three other species, *quadricornis*, *foreli*, and *tetragena*, are each known only from a single female specimen. It is interesting that these three species seem to fall into a single group on the basis of horn characters.

THE QUADRICORNIS GROUP

Members of the *quadricornis* group can be distinguished from other *Metaleptobasis* by their having four thoracic horns, a pair on the prothorax and a pair on the mesothorax. As males are unknown in all of the included species, the degree of relationship of this group with other groups of *Metaleptobasis* cannot be determined. The geographical distribution of the *quadricornis* group seems to be from central to northern South America. *M. quadricornis* is from Brazil at about 20 degrees south latitude. *M. foreli* is from Colombia, and *tetragena* is from British Guiana.

Two groups can be set up on the basis of the morphology of the male abdominal appendages, and one of these can be divided into two subgroups. Though these groupings are based on abdominal appendages, other morphological characters and zoogeographical considerations can be found which tend to indicate that they are natural.

THE DICERAS GROUP

In the *diceras* group the superior abdominal appendages are longer than the inferiors. This group contains three species,

diceras, cornicauda, and *macilenta. M. diceras* and *cornicauda* are both taken from Southeastern Brazil between 10 and 20 degrees south latitude. To date the only *Metaleptobasis* outside of this group known from as far south as 10 degrees south latitude is *quadricornis.* The locality on *macilenta* is no more definite than Brazil. Unfortunately material is scarce; females are not known for any of the species. Selys described the male and female of *diceras* but Williamson (1915) states, "It is not impossible that the type female (of *diceras*) in De Selys' collection will prove unidentifiable through inability to associate it certainly with the proper male of any one of possibly two or more closely related species."

The Bovilla Group

In the *bovilla* group the inferior appendages are longer than the superiors. This is apparently a larger group both geographically and with respect to number of species than the *diceras* group. The group consists of six known species, and can be divided into two subgroups of three species each.

The Manicaria Subgroup

The *manicaria* subgroup contains *manicaria, mauritia,* and *amazonica.* Its distribution is somewhat intermediate between the *diceras* group and the *bovilla* subgroup, and all of the specimens known come from between 10 degrees south latitude and 11 degrees north latitude. Both *manicaria* and *mauritia* have been taken in Trinidad which is the most northern known locality for this subgroup though *mauritia* has also been taken in British Guiana. One of the species of the *bovilla* subgroup, *brysonima,* is also from Trinidad, and another, *westfalli,* is from about two degrees south of Trinidad in Panama so the ranges as to latitude of the two subgroups as they are now understood overlap to some extent. In the *manicaria* subgroup the superior abdominal appendages in dorsal view are slender, curved, and subequal in width for their entire length.

The Bovilla Subgroup

The *bovilla* subgroup contains *bovilla, brysonima,* and *westfalli.* Geographically it has a more northern distribution than the *manicaria* subgroup. Its known range extends from about 9 to 16 degrees north latitude from Guatemala down through Panama to Trinidad. The *bovilla* subgroup can be separated

from the *manicaria* subgroup morphologically by the superior abdominal appendages which are shorter relative to the inferiors (less than two-thirds) and which, in dorsal view, are more than twice as wide at the bases as in the distal third.

ACKNOWLEDGMENTS

I am particularly indebted to Dr. Minter J. Westfall, Jr., who has been my counselor on Odonatological matters for several years. It was at his suggestion that I did the collecting in Panama which led to the discovery of the species described in this paper, and it is for him that the species is named. I also wish to thank Dr. Lewis Berner for his many helpful suggestions and criticisms. I am indebted to James Zetek, resident manager of the Canal Zone Biological Area, whose thoughtfulness made collecting in Panama more pleasant and profitable than it otherwise would have been. The figures are the work of Miss Esther Coogle, staff artist for the Department of Biology at the University of Florida.

LITERATURE CITED

Calvert, P. P. 1907. Biologia Centrali-Americana, Odonata. p. 386. Pl. 7, figs. 21-23.

————————. 1909. Contributions to a knowledge of the Odonata of the Neotropical region exclusive of Mexico and Central America. Ann. Carnegie. Mus. 6(1): 73-280, 9 pl.

————————. 1919. Odonata Zygoptera from Guatemala. Ent. News. 30: 160-165.

————————. 1948. Odonata (Dragonflies) of Kartabo, Bartica District, British Guiana. Zoologica 33(2): 47-87. 3 pl.

Geijskes, D. C. 1932. The dragonfly-fauna of Trinidad in the British West Indies (Odonata), Part I, Zygoptera. Zoologische Mededeelingen (Mus. Nat. Hist. Leiden), XIV(4): 232-262.

Ris, F. 1918. Libellen (Odonata) aus der Region der amerikanischen Kordilleren von Costarica bis Catamarca. Arch. f. Naturges. Berlin. 82(9): 1-192. 2 pl.

Selys, Longchamps, Le Baron Edmond de. 1877. Synopsis des Agrionines. Bull. Acad. Belg. Series 2. 43: 102-107. (Reprint p. 8-13.)

Sjöstedt, Y. 1918. Wissenschaftliche Ergebuisse der schwedischen entomologischen Reise des Herr Dr. A. Roman in Amazonas. 1914-1915. Odonata. Ark. Zool. Stockholm. 11(15): 1-54.

Williamson, E. B. 1915. Notes on Neotropical Dragonflies, or Odonata. Proc. U. S. Nat. Mus. 48: 601-638. 7 pl.

————————. 1916. Correction of the specific name of a dragonfly (Odon.). Ent. News, 28(1): 8.

CENTENNIAL OF PROFESSIONAL ENTOMOLOGY

The year 1954 marks the 100th anniversary of professional entomology in the United States. Plans to suitably commemorate this event have been proposed and sanctioned by the Entomological Society of America, the United States Department of Agriculture, the Experiment Station Section of the Land-Grant College Association, the Extension Service and other national groups. Every entomologist in this country will have an opportunity to participate in some way in this program and all entomologists should cooperate fully in helping to show the public at large the importance of fighting harmful insects and the desirability of protecting beneficial ones.

Indeed, the principal purpose of this celebration is to give the public information about the insect problem and about the contributions that entomologists have made to the national economy and to the health and welfare of the American people.

On February 25th, entomologists in the Gainesville area met to discuss the contributions that we can make to the celebration. A number of committees were named to assume responsibility for various phases of the program. Dr. Milledge Murphey, Jr., Dr. R. E. Waites, and the writer were asked to serve as a committee to secure and prepare suitable information to be used in radio and newspaper releases, magazine articles, and other ways. Some information will be supplied by the national Centennial Supervisory Committee but there is a need for material that pertains especially and particularly to Florida.

Among other things, the Committee proposes to prepare a short history of entomology in Florida and this will be published in the June issue of the Florida Entomologist. No doubt many readers of the Florida Entomologist have personal knowledge of interesting entomological events and happenings. Others will have photographs, letters, clippings, or other pertinent items that would be useful. Anyone having material of this nature is urged to send it to the Committee for consideration by April 5. Credit will be given for items used and they will be returned if requested. Contributions may be sent to any member of the Committee at the University of Florida, Gainesville.

A. N. TISSOT
Chairman

PERRY WILBUR FATTIG

The South has lost her finest collector of insects. On December 7, 1953, Dr. Perry W. Fattig, Curator of the Museum, Emory University, died of a heart attack. For the last 28 years he has devoted himself to the task of collecting and preserving representative specimens of the insects of Georgia, and to the compilation of check lists of these insects. Toward this end he collected and preserved hundreds of thousands of insects, along with exact data on their distribution, seasonal occurrence, host relationships, and characteristic behavior. His check lists of Georgia scarab beetles, robber flies, deer flies and horse flies, and other insect groups, which exceed in numbers of species those of any other southern state, will serve as a permanent testimonial to the great contribution which Mr. Fattig has made to our knowledge of our insect fauna.

Perry Wilbur Fattig was born June 1, 1881, in Lancaster, Ohio. He attended rural school in Liberty Township, Fairfield, Ohio, and graduated from Baltimore High School. He continued his studies at Crawfis Collegiate Institute, Ohio University, University of Michigan Biological Station, and Cornell University, majoring in entomological studies. He received his B.S. and M.S. degrees from Ohio University in 1912 and 1913, respectively, and received a second B.S. degree in education from Ohio State Normal College in 1914.

On September 3, 1903, he married Clara Mae Fenstermaker, and a son, Wilbur L., was born to them on May 25, 1906.

Mr. Fattig served as Professor of Biology, at Trinity University (1912-1913) ; Professor of Agriculture, at State Teachers College, North Dakota (1916-1918) ; Professor of Agriculture, at University of Florida (1918-1921) ; Professor of Biology, at State Teachers College, Virginia (1921-1926) ; and Curator of the Museum, at Emory University (1926-1953).

He was a member of the Florida Entomological Society, the Entomological Society of America, the American Association of Economic Entomologists, the Georgia Entomological Society, the American Association for the Advancement of Science, and the Methodist Church.

Always willing to take time to answer questions and to aid amateur collectors, Mr. Fattig entertained those fortunate enough to penetrate his native reserve with his unusual and humorous experiences. He will continue to live in the memories of his many friends.—Howard V. Weems, Jr.

MEMBERSHIP LIST OF THE FLORIDA ENTOMOLOGICAL SOCIETY

The following list of members has been compiled from the records of the Society. Any discrepancies should be reported to either the secretary or the business manager.

Abrams, Leroy, 46 New Street, Lynbrook, N. Y.
Acree, Edwin, B., Jr., 1416 N.E. 134 Road, N. Miami, Florida
Alden, J. C., Woolfolk Chem. Co., Ltd., Fort Valley, Georgia
Allen, R. F., 2213 Cambridge Ave., Lakeland, Florida
Anderson, Chris. W., Dept. of Plant Pathology, 102 Newell Hall, Gainesville, Florida
Anthony, Darrell Wayne, Flavet 3, 350-U, Gainesville, Florida
Arey, Phillip S., Box 2288, Orlando, Florida
Aycock, James F., 2324 Garfield St., Hollywood, Florida
Ayers, Ed L., Plant Commissioner, State Plant Board, Seagle Bldg., Gainesville, Florida
Baerman, Gerard D., Box 886, Charleston, S. C.
Ballentine, Corbin Christman, P. O. Box 3751, Orlando, Florida
Bare, C. O., 6019 Bonneu Road, Richmond 27, Virginia
Barnett, Joe P., R. 1, Box 163-B-1, Fort Pierce, Florida
Bartnett, R. E., Box 918, St. Augustine, Florida
Batte, Edward G., California Spray Chemical Corp., Haddonfield, N. J.
Beck, Elizabeth C., Box 443, Arlington, Florida
Beidler, E. J., 207 N. 17th W., Bradenton, Florida
Bellamy, R. E., 2311 B Street, Bakersfield, California
Bellows, J. M., Hector Supply Co., P. O. Box 1311, Miami, Florida
Benson, David Adams, Montverde, Florida
Berner, Lewis, Science Hall, Gainesville, Florida
Blanton, O. H., Penn Salt Chemical Co., Montgomery, Alabama
Boyd, Daniel Franklin, 306 N. Dale Mabry, Tampa, Florida
Braddock, W. B., Box 1082, New Smyrna Beach, Florida
Bradley, G. H., U. S. Public Health Service, 50 7th St. N.E., Atlanta 5, Georgia
Bragdon, K. E., Indian River City, Florida
Brian, C. E., Florida Agricultural Supply Co., Jacksonville, Florida
Brogdon, James E., 12 N.E. 4th Street, Gainesville, Florida
Brown, Rue L., 607 S. 4th Street, Fort Pierce, Florida
Bruber, S. C., Exp. Station, Santiago de Las Vegas, Cuba
Bruce, W. G., Box 989, Gulfport, Mississippi
Burgess, Joseph Edward, Jr., 448 S. Central Ave., Lakeland, Florida
Burns, T. C., Palmetto, Florida
Bussart, J. Everett, 215 W. Harrison Street, Wheaton, Illinois
Butcher, Gray F., University of Miami, P. O. Box 1015, South Miami, Florida
Byers, Francis C., Dept. of Biology, University of Florida, Gainesville, Florida
Cain, Thomas L., Jr., P. O. Box 1467, Cocoa, Florida
Cantrall, Irving J., George Reserve, Pinckney, Michigan
Chamberlain, F. S., Bureau of Entomology, Quincy, Florida
Chapman, Harold B., Box 3391, Orlando, Florida
Chase, Rowe R., 134 Peachtree Street, Atlanta, 3, Georgia

Chellman, C. W., 210T, Flavet 3, Gainesville, Florida
Christie, James Ronald, 619 E. 7th Avenue, Mount Dora, Florida
Clements, William Balloch, P. O. Box 65, Leesburg, Florida
Coarsey, James M., Jr., Box 3119, University Station, Gainesville, Florida
Coleman, K., Speed Sprayer Co., Orlando, Florida
Cooper, Geo., Glade & Grove Supply, Princeton, Florida
Creighton, J. T., College of Agriculture, Gainesville, Florida
Crutchfield, Cecil M., Box 448, Troy, Alabama
Crysell, Jerry, 33 E. 6th Street, Jacksonville, Florida
Dean, Wayne P., Swift & Co., Winter Haven, Florida
DeBusk, William T., Penn Salt Mfg. Co., Route 6, Box 11A, Montgomery, Alabama
Decker, J. W., Fort Clinch State Park, Fernandina, Florida
Deedman, Charles, American Cyanamid Company, New York, N. Y.
Dekle, G. W., State Plant Board, Seagle Bldg., Gainesville, Florida
Denmark, Harold Anderson, State Plant Board, Gainesville, Florida
Diem, J. J., P. O. Box 324, Palmetto, Florida
Dobrovsky, T. M., Potato Investigations Lab., Hastings, Florida
Dorward, Kelwin, U. S. Dept. Agriculture, B. E. P. Q., Washington 25, D. C.
Douglas, Robert W., R. 5, Box 105-B, Gainesville, Florida
Dove, W. E., P. O. Box 1956, Baltimore 3, Maryland
Dowling, Curtis F., Jr., Chixiqui Land Company, Almirante, Panama
Driggers, J. E., P. O. Box 37, Lake Butler, Florida
Duncan, D. V., P. O. Box 435, Lakeland, Florida
Dumas, C. J., 408 S. Riverside Drive, New Smyrna, Florida
Enzor, Joe K., Jr., 106 Auck N.E., Winter Haven, Florida
Fairchild, G. B., Gorgas Memorial Laboratory, Box 5025, Ancon, C. Z.
Fenton, F. A., Entomology Dept., Okla. A. & M. College, Stillwater, Okla.
Fisher, F. E., Citrus Exp. Sta., Lake Alfred, Florida
Fowler, Harland Wade, Jr., 826 N.E. Oak Street, Arcadia, Florida
Fox, Irving, Dept. of Medical Zoology, School of Tropical Medicine, San Juan, Puerto Rico
Foy, John E., Jr., 1101 Wallace S. Bldg., Tampa, Florida
Frederick, John M., Box 455, Homestead, Florida
French, Ellery W., 6505 S.W. 5th Court, South Miami, Florida
Friedman, Herbert J., 306 N. Dale Mabry, Tampa, Florida
Frierson, Paul E., State Plant Board, Seagle Bldg., Gainesville, Florida
Gahan, J. B., Bureau of Entomology & Plant Quarantine, Box 3391, Orlando, Florida
Genung, W. G., RR No. 1, Box 520, Lake Worth, Florida
Gibson, Kenneth E., USDA, P. O. Box 218, Union Gaps, Washington
Gilbert, I. H., 2111 Gerda Terrace, Orlando, Florida
Goin, Colman J., Dept. of Biology, Univ. of Fla., Gainesville, Florida
Goodwin, Thomas R., Jr., 1314 Florida Avenue, Fort Pierce, Florida
Gresham, W. B., Jr., 4302 Vasconia, Tampa 9, Florida
Griffiths, J. T., 230 Ave. K., N.E., Winter Haven, Florida
Gross, Joseph, 10403 N. Oregon, Tampa, Florida
Gurney, A. B., Div. of Insects, U. S. Natl. Museum, Washington 25, D. C.
Guthrie, Frank Edwin, North Florida Experiment Station, Quincy, Florida
Haeger, James S., 1906 33rd Ave., Vero Beach, Florida
Hale, Roger H., Route 1, Palmetto, Florida

Hardeman, Laurence E., Stauffer Chemical Co., Tampa, Florida
Harris, Emmett D., Jr., 162 Veterans Place, Ithaca, N. Y.
Harz, A. W., 13 West Underwood Street, Orlando, Florida
Haynie, J. D., Agriculture Experiment Station, Gainesville, Florida
Hayslip, Norman C., Box 507, Fort Pierce, Florida
Hayter, W. B., P. O. Box 536, Leesburg, Florida
Heald, Howell L., 399 Atlantic Blvd., Pompano Beach, Florida
Henderson, H. Cecil, Box 1709, Jacksonville, Florida
Herring, Russell K., 3004 Ridgeway Ave., West Palm Beach, Florida
Hetrick, L. A., Dept. of Entomology, University of Florida, Gainesville, Florida
Hill, Charles C., 661 N.W. 39th Street, Miami, Florida
Hogan, William D., 1027 Nottingham Avenue, Orlando, Florida
Holland, Frank L., Fla. Inst. Agr. Research, Winter Haven, Florida
Holtsberg, I. Harold, 132 N. 12th Street, Fort Pierce, Florida
Hood, J. Douglas, Biology Dept., Cornell University, Ithaca, N. Y.
Howard, Frank L., Box 996, Winter Haven, Florida
Hubbell, T., Museum of Zoology, University of Michigan, Ann Arbor, Michigan
Hudson, R. W., 224 E. Govt. St., Pensacola, Florida
Hunt, Burton P., Zoology Dept., University of Miami, Coral Gables, Florida
Hunt, Paul J., Florida State Board of Health, Jacksonville, Florida
Hunter, W. P., Route 2, Box 61, Alachua, Florida
Hussey, Roland F., 117 N.W. 3rd Ave., Gainesville, Florida
Hyman, Julius, Box 764, South Miami, Florida
Irey, William R., 1720 Guntler Court, Orlando, Florida
Isbell, Max, 102 City Park, New Orleans, Louisiana
Jacoway, Thomas H., 3010 15th Ave. W., Bradenton, Florida
Jennings, W. R., Stauffer Chemical Co., Apopka, Florida
Johnson, Edward Carlton, P. O. Box 146, Pompano Beach, Florida
Johnson, Roger B., Box 289, Lake Alfred, Florida
Jones, Calvin M., Dept. of Veterinary Science, Fla. Agric. Exp. Sta., Gainesville, Florida
Jones, Frank M., 2000 Riverview Ave., Wilmington, Delaware
Jorgensen, Milford C., Box 233, Ruskin, Florida
Kaspar, P. E., Sherwin Williams Co., P. O. Box 906, Tampa, Florida
Kearney, James Frederick, R. 2, Box 990 B, Largo, Florida
Kelemen, Dennis, 880 Bunker Hill Blvd., Jacksonville, Florida
Kelsheimer, E. J., Vegetable Crops Laboratory, Bradenton, Florida
Kimball, Charles P., R. 4, Box 942, Sarasota, Florida
Kime, C. D., County Agent, Fort Pierce, Florida
Kime, C. D., Jr., Rt. 1, Winter Haven, Florida
King, W. V., 1336 Seabreeze Ave., Fort Lauderdale, Florida
Kirkland, Robert O., 1029 N.E. 8th Avenue, Gainesville, Florida
Kleinhans, R. B., 3535 Evanston Ave., Cincinnati 7, Ohio
Knight, Kenneth L., Malaria and Mosquito Control Unit 1, U.S.A. Naval Air Station, Jacksonville, Florida
Knipling, E. F., Bureau of Ent. & Pl. Quar., U.S.D.A., Washington, D. C.
Krestensen, Elroy R., State Board of Health, Jacksonville, Florida
Kuitert, L. C., Newell Hall, Gainesville, Florida
Labrecque, Germain Claude, P. O. Box 3391, Orlando, Florida
Ladeburg, C. F., Box 6085, West Palm Beach, Florida

Lanier, James A. 2nd, The Chemagro Corp., 350 5th Avenue, New York 1, New York
Lanquist, Ellis, Bolles School, Jacksonville, Florida
Littig, Kent S., 439 Ansley Street, Decatur, Georgia
Long, Paul K., P. O. Box 838, Winter Park, Florida
Long, Wallace T., P. O. Box 507, Fort Pierce, Florida
Mabry, Jean Ellis, 498 Preventive Med., Ft. George, Mead, Maryland
Mathias, Arthur F., 720 Glendale, Lakeland, Florida
Maughn, Douglas, Calif. Spray Chemical Corp., Box 1231, Orlando, Florida
Maxwell, L. S., Jackson Grain Co., Box 1290, Tampa 1, Florida
Mayeux, Herman S., General Delivery, Arlington, Florida
McCurdy, Willard W., Box 357, Pahokee, Florida
Mead, Frank W., State Plant Board, Seagle Bldg., Gainesville, Florida
Merrill, G. B., State Plant Board, Gainesville, Florida
Merrill, W. H., State Plant Board, Gainesville, Florida
McDuffie, William C., Box 3391, Orlando, Florida
Metcalf, Z. P., N. C. State University, Raleigh, North Carolina
Miller, Ralph L., 701 S. Hyer Street, Orlando, Florida
Mills, Alfred Schultz, 2305 N.W. 87th Street, Miami, Florida
Mockford, Edward, Dept. of Biology, University of Florida, Gainesville, Florida
Moore, L. H., Box 1028, Clemson, South Carolina
Moses, Philip John, P. O. Box 542, Lake City, Florida
Mowry, Harold, Apartado 1649, San Jose, Costa Rica, C. A.
Mulrennan, J. A., State Board of Health, Jacksonville, Florida
Muma, Martin H., Box 324, Lake Alfred, Florida
Murphey, Milledge, Jr., Dept. of Entomology, University of Florida, Gainesville, Florida
Myers, Forrest Earl, Fla. Ag. Ext. Service, Gainesville, Florida
Nabors, C. Marion, P. O. Box 5737, Tampa, Florida
Neal, J. H., Hercules Powder Co., 134 Peachtree St., Atlanta, Georgia
Nicholas, Constance G., Box 2919, University Station, Gainesville, Florida
Nicholson, Joe, P. O. Box 274, San Antonio, Florida
Nielsen, Erik Tetens, Florida State Board of Health, Vero Beach, Florida
Noegel, Charles T., 1802 W. University Ave., Gainesville, Florida
Norman, Gerald G., State Plant Board, Seagle Bldg., Gainesville, Florida
Norman, Paul A., Route 6, Box 211K, Orlando, Florida
Osburn, Max R., Box 107, Albany, Georgia
Oser, Theodore, 591 Peachtree St., N.E., Atlanta, Georgia
Osorio, J. M., Escuela de Ingenieros Agronomos, Quinta de Las Molinos, Habana, Cuba
Palmer, Charles Malcolm, 340 E. Lemon, Bartow, Florida
Patton, J. W., University of Florida, Gainesville, Florida
Pepper, John Oscar, 413 Ridge Ave., State College, Pennsylvania
Phillips, A. M., Pecan Laboratory, Monticello, Florida
Porter, John E., U. S. Quarantine Station, P. O. Box 1246, Miami Beach 39, Florida
Pospichal, A. T., Stauffer Chemical Co., Apopka, Florida
Pratt, R. M., Citrus Experiment Station, Lake Alfred, Florida
Provost, M. W., P. O. Box 1871, Orlando, Florida
Purcell, Jack, S. B. Penick & Co., New York, New York
Rebstock, R. B., Box 1630, West Palm Beach, Florida

Reed, R. R., Gulf Fertilizer Co., Tampa, Florida
Register, M. E., % Kilgore Seed Co., West Palm Beach, Florida
Reichart, Charles Valerian, Biology Dept., Providence College, Providence 8, Rhode Island
Remington, Charles L. Box 653, Orlando, Florida
Rhoades, W. C., Box 470, North Florida Experiment Station, Quincy, Florida
Richardson, E. G., 25 South Main Street, Orlando, Florida
Riherd, Paul T., Texas Ag. Exp. Sta., Substation 15, Weslaco, Texas
Robinson, Frank, Dept. of Entomology, Newell Hall, U. of F., Gainesville, Florida
Rogers, A. J., Route 4, Box 368, Gainesville, Florida
Rogers, J. Speed, Museum of Zoology, University of Michigan, Ann Arbor, Michigan
Rohwer, George Gregor, 1290 Wesleyan Dr., Macon, Georgia
Russell, Jack, P. O. Box 177, Sanford, Florida
Scaramuzza, L. C., Central Mercedes, Matanzas Province, Cuba
Seabrook, Ed, P. O. Box 7, Lake Park, Florida
Sheppard, Raymond R., P. O. Box 1888, Sarasota, Florida
Simaton, William A., Citrus Experiment Station, Lake Alfred, Florida
Sistrunk, Theron W., Apt. 251-B, Flavet 3, Gainesville, Florida
Skipper, Clinton C., P. O. Box 755, Avon Park, Florida
Sloan, William C., Department of Biology, U. of F., Gainesville, Florida
Sloan, G. Dexter, P. O. Box 1021, Tampa 1, Florida
Smith, R. J., American Cyanamid Co. N., Powder Spring, Georgia
Spencer, Herbert, USDA Laboratory, Ft. Pierce, Florida
Stahl, Walter B., 1714 62nd Street, Brooklyn 4, New York
Stearns, Charles R., Jr., Box 1134, Lake Alfred, Florida
Steflik, Louis M., Box 2027, University Station, Gainesville, Florida
Steuben, Edmund Bruno, Dept. of Biology, Arlington State College, Arlington, Texas
Stoddard, David L., 205 Walcaid Bldg., Bradenton, Fla.
Stoner, Warren Norton, 237 D Street, Davis, Calif.
Stripling, Earl L., Jr., California Spray Chemical Corp., P. O. Box 1231, Orlando, Florida
Sutton, C. L., P. O. Box 1231, Orlando, Florida
Swank, George R., Rt. 4, Box 564, Savannah, Georgia
Sapp, Dempsey R., 2220 N.W. 6th Street, Gainesville, Florida
Sells, J. Duncan, 1721 Dormont Street, Orlando, Florida
Taber, Robert Hall, P. O. Box 124, Florida City, Florida
Tappan, William B., 106 Arbutus Ave., DeFuniak Springs, Florida
Taylor, Doyle S., 2109 Enolam Blvd., Decatur, Alabama
Thames, Walter H., Jr., Everglades Experiment Station, Belle Glade, Florida
Theuer, B., Biology Department, U. of F., Gainesville, Florida
Thompson, R. K., California Spray Chemical Corp., Kresson Road, Haddonfield, New Jersey
Thompson, W. L., Citrus Experiment Station, Lake Alfred, Florida
Thulberry, Douglas, U. S. Phosphoric Co., Tampa, Florida
Thullberry, Howard A., Haines City, Florida
Thurman, Ernestine H. B., % D. C. Thurman, Sr., Menard, Texas
Tippins, H. H., Box 2217, Spring Hill, Alabama
Tissot, A. N., Agr. Exp. Station, Univ. of Fla., Gainesville, Florida
Toffaleti, James P., P. O. Box 1164, Shreveport, Louisiana

Tomasello, R. P., 839 El Predo, West Palm Beach, Florida
Treadwell, J. H., 1222 Woodward Ave., Montgomery, Alabama
True, H. H., 438 N.E. 8th Avenue, Ft. Lauderdale, Florida
Truman, R. B., Truman Fertilizer Co., Box 1175, Jacksonville, Florida
Valcarcel, Federico G. Morales, Simon Bolivar 163, La Habana, Cuba
Vanderford, Henry T., 2 South Oakwood Drive, Savannah, Georgia
Van Horn, M. C., 4517 Peachtree Circle, East, Jacksonville 7, Florida
Van Pelt, Arnold F., Dept. of Biology, Appalachian State Teachers College, Boone, North Carolina
Varner, Reed William, Box 353, Manatee, Florida
Vaughn, Sam H., 1908 Conway Road, Orlando, Florida
Villegas, Jaime, 502 N.W. 16th Ave., Gainesville, Florida
Voorhees, K. R., Box 3751, Orlando, Florida
Wagner, William Edward, 1955 37th Ave., Vero Beach, Florida
Waites, Robert Ellsworth, 805 N.E. 8th Ave., Gainesville, Florida
Wallace, H. K., Biology Department, U. of F., Gainesville, Florida
Walley, G. Stuart, Division of Entomology, Department of Agriculture, Ottawa, Ontario, Canada
Warner, W. W., 2213 Fogarty Ave., Key West, Florida
Watson, J. D., Penn Salt Mfg. Co., Route 6, Box 11-A, Montgomery, Alabama
Weems, H. V., State Plant Board, Gainesville, Florida
Webb, Stanley Doyle, Route 3, Box 46, Gainesville, Florida
Wells, Stafford Livingston, P. O. Box 687, Homestead, Florida
Westfall, Minter J., Dept. of Biology, Univ. of Fla., Gainesville, Florida
Whiddon, Moody K., P. O. Box 1015, Ft. Pierce, Florida
Whipp, Arthur A., P. O. Box 1231, Orlando, Florida
White, James F., 707 High Street, Jackson, Mississippi
Whittaker, Walter G., Pi Kappa Alpha House, Gainesville, Florida
Wright, M. L., 1524 Lawrence Place, Rt. 11, Box 732-A, Jacksonville, Florida
Wigger, Alvin L., 92 14th St., N.E., Atlanta, Georgia
Williams, Ralph Edward, P. O. Box 129, Orlando, Florida
Wilson, J. W., Central Fla. Exp. Station, Sanford, Florida
Wirwille, James W., Penn Salt Mfg. Co., Route 6, Box 11A, Montgomery, Alabama
Witham, Mark A., Stuart, Florida
Witherington, Charles Gordon, AO 300 441, P. O. Box 215, Gunter Air Force Base, Alabama
Wolfenbarger, D. O., Rt. 2, Box 508, Homestead, Florida
Young, Frank N., Dept. Zoology, Indiana University, Bloomington, Indiana
Young, H. C., U.S.D.A., Florala, Alabama
Young, J. Ralph, P. O. Box 788, Ft. Pierce, Florida
Zetek, James, Drawer Z, Balboa, Canal Zone
Ziegler, L. W., 205 Floyd Hall, University of Florida, Gainesville, Florida

HONORARY MEMBERS

Brues, Charles T., General Delivery, Georgetown, Florida
Johannsen, O. A., Palm Terrace, Gainesville, Florida
Needham, James G., 6 Needham Place, Ithaca, New York
Osborn, Herbert, Ohio State University, Columbus, Ohio
Patch, Edith M., Box 150, Orono, Maine
Yothers, W. W., 457 Boone Street, Orlando, Florida

CHLORDANE

CONTROLS THESE INSECTS

- Ants
- Armyworms
- Blister Beetles
- Boxelder Bugs
- Brown Dog Ticks
- Cabbage Maggots
- Cattle Lice
- Chiggers
- Chinch Bugs
- Cockroaches
- Cotton Boll Weevils
- Crickets
- Cutworms
- Earwigs
- Fleas
- Flies
- Grasshoppers
- Household Spiders
- Japanese Beetle Larvae
- Lawn Moths
- Lygus Bugs
- Mole Crickets
- Mormon Crickets
- Mosquitoes
- Onion Maggots
- Onion Thrips
- Plum Curculio
- Sarcoptic Mange
- Seed-Corn Maggots
- Serpentine Leaf Miners
- Sheep Ked
- Silverfish
- Sod Webworms
- Southern Corn Rootworms
- Strawberry Crown Borers
- Strawberry Weevils
- Sweet Clover Weevils
- Tarnished Plant Bugs
- Termites
- Ticks
- White Grubs
- Wireworms

AND MANY OTHERS

Write for Specific Technical Bulletins

VELSICOL CORPORATION

General Offices and Laboratories
330 East Grand Avenue, Chicago 11, Illinois

Export Division
100 East 42nd Street, New York 17, New York

REPRESENTATIVES IN PRINCIPAL CITIES

PETROLEUM DERIVED CHEMICALS
VELSICOL
SERVING BASIC INDUSTRIES

PESTICIDES

FOR

FLORIDA TRUCK CROPS

•

The Kilgore Seed Company, manufacturers and formulators of Insecticides and Fungicides, offers a complete advisory service to Florida Farmers through the facilities of its 14 Stores, Laboratory and technically trained Field Staff.

•

THE KILGORE SEED COMPANY

GENERAL OFFICES: PLANT CITY, FLORIDA
LABORATORY: WEST PALM BEACH, FLORIDA

•

Stores located at
BELLE GLADE, FT. MYERS, GAINESVILLE, HOMESTEAD, MIAMI, OCALA, PAHOKEE, PALMETTO, PLANT CITY, POMPANO, SANFORD, VERO BEACH, WAUCHULA, WEST PALM BEACH

For complete, accurate,

up-to-date information on

PARATHION

and

MALATHION

(also known as malathon)

direct your inquiries to the

developer of these important

broad-spectrum insecticides...

AMERICAN Cyanamid COMPANY

Manufacturer of *Thiophos*® Parathion Technical
and MALATHION Technical

AGRICULTURAL CHEMICALS DIVISION
30 Rockefeller Plaza, New York 20, N. Y.

Glance behind the agricultural research scene at Rohm & Haas and you would say: "The future is going to be rough on farm pests." And you would be right! Development of agricultural chemicals is hitting a faster pace than ever at the company's laboratories and experimental farms.

Hornworms and the red-banded leaf roller are kept under control by RHOTHANE; plant diseases are checked by DITHANE. Many pests on the farm must still be licked. But for every one, intensive research will ultimately spell control.

DITHANE Fungicides

DDT Insecticides

LETHANE—fast knockdown agent in household and livestock sprays.

RHOTHANE (DDD or TDE) Insecticides

TRITON emulsifiers are offered in a wide selection for the emulsification of many organic pesticides used today.

WEED KILLERS
2,4-D and 2,4,5-T herbicides
2,4-D acid
Butyl and Isopropyl ester concentrates
Capryl ester low volatile formulations
Amine salt of 2,4-D
Ester formulations
Brush killer formulations containing capryl esters of 2,4-D and 2,4,5-T

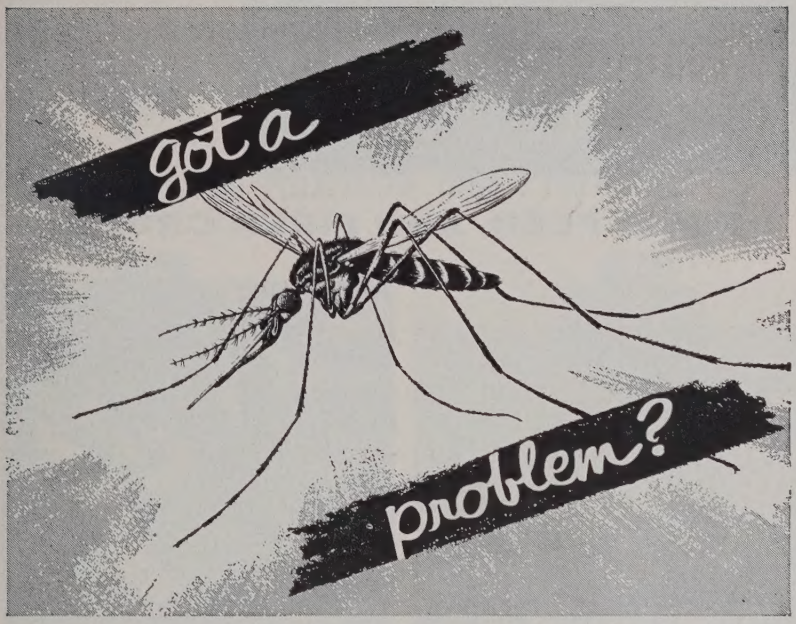
CHEMICALS FOR AGRICULTURE

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

DITHANE, LETHANE, RHOTHANE *and* TRITON *are trademarks, Reg. U.S. Pat. Off. and in principal foreign countries.*



use dieldrin

Dieldrin in small doses give effective mosquito control. It is also one of the most efficient controls for adult houseflies, salt marsh sand fly larvae, ticks, chiggers and fleas.

Dieldrin treatments remain effective for long periods. **One** application controls these public health pests for several weeks in exposed areas — for several months in protected areas.

Dieldrin has been proved by such experienced users as Pest Control Operators, Public Health Organizations and Mosquito Abatement Crews.

Technical literature on formulation and application of dieldrin will be sent to responsible parties on request.

Technical dieldrin is supplied by Shell Chemical Corporation and well-known insecticide manufacturers sell it under their own brand name.

SHELL CHEMICAL CORPORATION

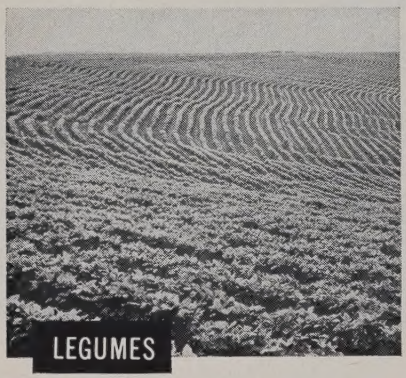
Agricultural Chemicals Division

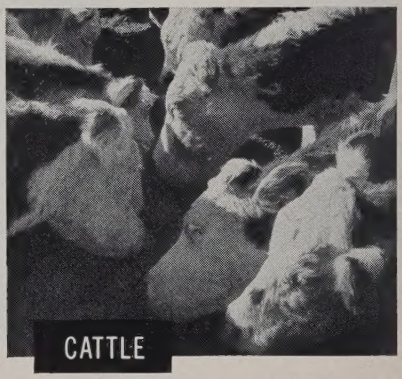
P. O. Box 1617, Denver 1, Colorado

Atlanta — Houston — New York — San Francisco — St. Louis
Jackson, Mississippi

TOXAPHENE PROTECTS

FOOD, FEED, AND FIBER CROPS





Wherever you live, it's probable that the crops grown there can benefit from insecticides based on toxaphene (chlorinated camphene 67-69% Cl). Recommended for effective control of more than 150 different species of insect pests, toxaphene dusts and sprays are helping to protect food, feed and fiber crops —to increase yields throughout the world.

Naval Stores Department
HERCULES POWDER COMPANY
INCORPORATED
949 King St., Wilmington 99, Del.

Your Profit Combination

For Crop Nutrition and Protection

FERTILIZERS
For every crop, for every need

PESTICIDES
Complete range of modern, scientific formulations.

GRO-TONE
Super Plant Food

For lawns, gardens and shrubs

EXPERTS at your service

Our qualified specialists are available for consultation when you encounter unusual problems in either your fertilizing program or pest control.

WILSON & TOOMER
FERTILIZER COMPANY
and Divisions
FLORIDA AGRICULTURAL SUPPLY COMPANY
Peninsular Fertilizer Works—Tampa • Cartledge Fertilizer Company—Cottondale
GENERAL OFFICES • JACKSONVILLE, FLORIDA

SPRAY or DUST

with Reliable, Dependable

Black Leaf 40 provides *multiple protection* against aphids, most thrips and similar sucking insects. Kills by contact and by fumes — versatile, economical, effective protection against crop losses.

Black Leaf 40 is *discriminating*. Controls aphids and other destructive pests — spares beneficial insects.

Black Leaf 40 is *compatible* with other standard spray and dust materials. Leaves no harmful residue.

Companion Products:

Black Leaf 3% Nicotine Dust
Black Leaf Nicotine-Rotenone-Sulphur Dust
Nico-Fume Pressure-Fumigators
Benzo-Fume Pressure-Fumigators
Nico-Fume Liquid

TOBACCO BY-PRODUCTS & CHEMICAL CORPORATION

RICHMOND, VIRGINIA